

Title: From Big to Small - We're Playing Basketball

Brief Overview:

Using the standard class configuration and cooperative groups students will observe, discuss, collect, interpret, and generate data about basketball stats in general and the free throw shot in particular. This class will use information to make predictions and generate charts, plots, and graphs. Students will use a journal to log predictions, findings, conclusions, and recommendations.

Link to Standards:

- **Problem Solving** Students will demonstrate the ability to solve problems in mathematics, including problems which are solved in cooperation with peers and problems which are basketball related.
- **Communication** Students will demonstrate the ability to communicate mathematically. They will read, write and discuss mathematics with the language, signs, and symbols appropriate for the task of the discipline.
- **Reasoning** Students will demonstrate the ability to reason mathematically. They will gather and utilize data.
- **Connections** Students will demonstrate their ability to connect data and be able to make inferences and recommendations.
- **Number Relationships** Students will demonstrate their ability to apply estimation strategies in problem solving. They will represent numbers in a variety of equivalent forms.
- **Statistics** Students will demonstrate their ability to collect, organize, and display data specific to basketball and will interpret information obtained from displays. They will write based on statistical information in letter and log form.

Grade/Level:

Grades 4 - 6

Duration/Length:

This lesson will take 3 or 4 periods (50 min.).

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Identifying geometric shapes
- Choosing appropriate display of data
- Predicting outcomes
- Interpreting data obtained from displays

- Construction of tally charts, scatter plots, and bar graphs
- Changing fractions to percentages

Objectives:

Students will:

- work cooperatively in groups.
- collect and organize data from resources.
- interpret data and determine its relevance and use
- generate and graph/chart data from group experiments
- compare statistical findings with professional basketball player's statistics
- identify geometric shapes: square, rectangle, cylinder, and circle

Materials/Resources/Printed Materials:

- TI Math Explorer calculator or equivalent
- Ruler
- TI-82 or TI-85 graphics calculator
- Books on famous basketball players and the game of basketball
- Newspapers and sports journals
- Basketball cards with individual stats.
- Internet address for current N.B.A. stats (<http://www.nba.com>)
- Buckets (to be used as baskets)
- Tennis balls
- Masking tape
- Basketball posters (to be displayed around the room) optional

Development/Procedures:

Day 1: Introduction

- Begin the class by brainstorming the reasons for and importance of collecting and studying data.
- List on the board types of data that are collected.
- Discuss the use of basketball statistics as it relates to improving team, individual performances and motivating career goals.
- Display various forms of basketball data, i.e.,
 - basketball cards
 - newspapers, charts, and tables
 - sports magazine articles
- Have the students interpret the various forms of data.
- Have the class make journal entries summarizing the importance (as they see it) of data collection and how it (collecting data) is used in basketball. Have the journal entries also include their interpretation of displayed basketball statistics as a support to their summary.

- Arrange the class in groups of 3-4 and have them decide on the best example of the above mentioned journal entry and present that to the class. The finest example should be made up as a poster for classroom display as well as entered into each journal.
- Discuss and model various methods of displaying data (i.e., tally, line plot, scatter graph, bar graph, etc.).
- The class should determine which method is best for displaying basketball statistics of a single feature. (i.e., free throws).
- The class should justify their determination of the above.
- On the overhead or with hand outs distribute various data (untitled) have the students (in groups) title them and write an interpretation of each. Decide and label what type of display would be best for each.
- The groups should then chose one of the titled pieces and display it in the decided manner then present it to the class.
- Conclude the lesson by: (1) reading aloud the story of a famous basketball player, (2) telling the class interesting sports facts, or (3) reading the history of the game of basketball.
- HOMEWORK: Collect some form of data to present to the class. Be able to briefly interpret it and explain its relevance to you. Bring in or wear the shirt or hat of your favorite team (if you have one of these items).

Day 2:

- Begin with some sharable personal data and tell why it is important to you and perhaps others.
- Solicit students to share their collected data and its relevance to them.
- Ask the class what they consider when choosing a favorite team.
- Tell the class to get into their groups.
- Distribute to the class a hand out or inform the class of the numerical dimensions of a standard basketball court.
- Question the class as to why this data (stated above) is important.
- Have each student utilize this data by drawing a basketball court in their journal.
- The group should then draw (with masking tape) on a designated area of the room a half court for their group experiment.
- Explain that each group member will generate their own data for successful baskets on the free throw line of their "court" and compile that with the group's data of the same.
- Each child should construct a chart that would allow them to record their predicted, as well as their actual individual and group data.

- The group should then share their chart ideas and choose the most effective to use.
- Distribute experiment supplies. (buckets - for baskets, and tennis balls)
- Assign group roles:

Timer, Recorder, Shooter/Retriever

Timer - Counts designated throws or time allotted

Recorder - Records individual predictions and then the actual score

Shooter/Retriever - Makes as many free throws as he/she can in a certain time or a certain amount (whatever is decided on by the teacher - i.e. everyone does 10 throws or does as many shots as possible in 60 sec.). The successful shots will be recorded. The shooter retrieves all the balls after the allotted number of shots or the expiration of time. The shooter then passes the bucket and balls to the next shooter ; and takes over that person's role.

This process is repeated until every one has a chance to shoot.

- After the experiments are completed the class should go to their individual seats.
- Each student should put their scores in the form of a fraction and a decimal.
- The prediction, actual score, fractional and decimal representation should be put on a chart.
- A team average of each column above should be calculated.
- A bar graph should be constructed to display each individual's results in the group.
- Another form of display should also be chosen to display data.
- Charts can be shared and each group should interpret at least one other group's data in their journal in paragraph form.
- Conclude lesson with students sharing either verbally or in their journal what they liked/disliked about the unit and what they learned from the unit.

Day 3:

- Discuss the importance of communicating and interpreting data accurately. Write results on the board.
- Discuss how their data (from the experiment) can be used by a professional team. Write the results on the board.
- Write a descriptive, persuasive letter to a NBA or local basketball team persuading them to focus on free throw shots for every player based on interpreting that data. Inform the team of your group's findings under experimental conditions. Include graphs or tables if necessary. Request information and/or a visit.

- Have a few students share their letters.
- Check the rubric (supplied)to suggest improvements - within each group.
- Students should make necessary changes.
- Students should share a few improved letters in class.
- Conclude lesson by reading aloud a basketball story of a player who's stats have improved or showing a basketball film/video.
- HOMEWORK: Type/ rewrite letters for mailing.

Performance Assessment:

See Student Resource 3.

Extension/Follow Up:

1. Duplicate activity with any organized sport's data.
2. Read the response letters , compare data.
3. Create a "shot" want ad where students will make an advertisement persuading basketball players to perfect a shot . Include data in the advertisement.
4. Have students label geometric terms associated with their drawn basketball courts
5. Tally predicted and actual number of shots achieved using number of attempts or time limits.
6. Make a scatter plot of years in the NBA with high percentage scoring. Write about the correlation or lack there of.
7. Make a bar graph of individual free throw percentages of NBA players.

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RUBRIC

Questions to Ask Yourself While Scoring a Response:

- Does the student use appropriate mathematical terms in the letter?
- Does the student interpret data correctly?
- Does the student compare the data they collected to that and the professional basketball team?
- Does the student use the letter form?

Scoring Rubric:

High Response:

A student would have a creative response which would include the use of appropriate mathematical terms representing his/her work and the ability to interpret data.

Medium Response:

He/She must have at least two out of the four requirements in his/her final work.

Low Response:

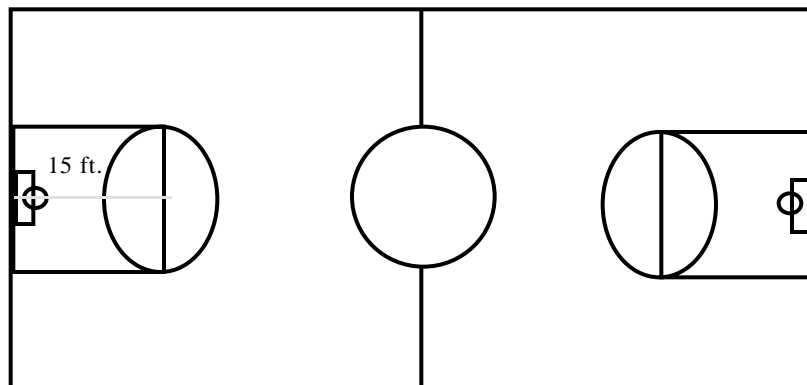
A student would have one of the four requirements in his response.

Complete.

- ☐ I used the appropriate math terms in my letter.
 - ☐ I interpreted data accurately.
 - ☐ I compared the group's data to a professional team's data.
 - ☐ I used the letter format.

Basketball Terms:

- Assist** - A pass from one teammate to another which allows the receiver of the ball to score a field goal.
- Rebound** - To re-cover a ball from mid-air after a field goal attempt but fail to go through.
- Steal** - To take the ball from an opponent without fouling him or her.
- Field Goal** - A successful attempt at throwing/shooting or jamming/dunking a basketball through a metal cylindrical hoop with a hanging net within a range of 20 feet.
- 3 PT. Field Goal** - A successful attempt at throwing/shooting a ball through a cylindrical metal hoop with a hanging net from a distance no closer than 22 feet.
- Free Throw** - A 15 foot shot from behind a line in the free throw circle. Players from opposing teams line up along the free throw lane and cannot step into the lane until the shooter releases the basketball.
- Professional Basketball Court Dimensions** - 94ft.L x 50ft.W



Vignette for Performance Assessment

Vignette

One professional basketball player has attempted 91 free throws and made 63. Another professional basketball player attempted 72 free throws and made 50. A third professional basketball player attempted 83 free throws and made 26. A fourth professional basketball player attempted 113 and made 92.

Make fractions from these findings and display them as a percent. List the player's statistics in order from highest percentage to the lowest percentage. Construct a bar graph of their interpreted percentage data and draw conclusions from the graph.